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LARVAL TAPEWORM IN HUMAN FLESH.*

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GENTLEMEN—I present this paper for two reasons:

First—Because only one physician has before observed it and called the medical profession's attention to it. It was Ijima, a Japanese physician, in 1905.

The second reason is—That by calling your attention to it, you may be on the lookout for it, and finding it, we may find how infection takes place, means of curing and how to prevent others from being infected.

I was called to treat patient for diarrhea. While examining over bowels I noticed indurated condition of flesh, and small nodules in the skin. The appearance of skin somewhat resembled acne, yet not showing points of congestion and inflammation as in acne. Some of the nodules or cysts were so near the surface that they were only covered with a layer of epidermis. Those near surface were the only ones that produced itching, and in some points he would scratch off skin with fingernails and squeeze out worms.

I opened some of the nodules and found they contained from one to three worms. They were all of different shapes. Some were flat and made up of segments like miniature tapeworms, with budding process from side, so that I could not tell head from tail. Others were round in part and flat in other parts, with thread-like connections between. They had limited movements when first extracted from sac by contracting and expanding the budded ends. Also a slight lateral motion.

The different forms and shapes are shown by the pictures of the specimens I sent to Dr. C. W. Stiles, Zoologist for United States Government. They are from Fig. 5 to 15x10.

They reproduce by budding and segmentation, so after infection starts it is a continuous process of further infection.

The muscles seem to be exempt. It is the integument, the superficial, and deep fascia, and the lymphatics, which are invaded.

The photographs show enlargement of left breast and shoulder, also left groin and lumbar region. His spleen and liver are enlarged. The lymphatic glands of left side are all enlarged and in some places form masses as if glands, flesh and worms were altogether in tumor formation. As this process has been going on for twenty-three years, there are large areas of indurated tissue.

The point of infection was on left shoulder, and has been confined to left side until last four or five years. For that reason most of the tumors of indurated tissues and worms are on the left side.

This infection is not on the body where exposed to sunlight. Would that be a suggestion for the X-ray treatment?

To make my paper more complete, I will

the lump, from which came a small, flat worm, about 1-16 inch wide and 5-8 inch long. One year after the first appearance on the shoulder he noticed four or five small lumps on his chest; these he opened with a knife and he picked out the same kinds of worms; these swellings also had produced an itching sensation. Patient was then living as fisherman on Sarasota Bay.

"While fishing patient's diet consisted of smoked and dried fish, raw oysters, scallops and clams. Up to five or six years ago he was a robust, healthy specimen of manhood, but lacking energy. At present he has a tired expression, has less energy, and becomes exhausted after little exertion.

"From the photographs, you will see enlargement of the left breast and shoulder, also

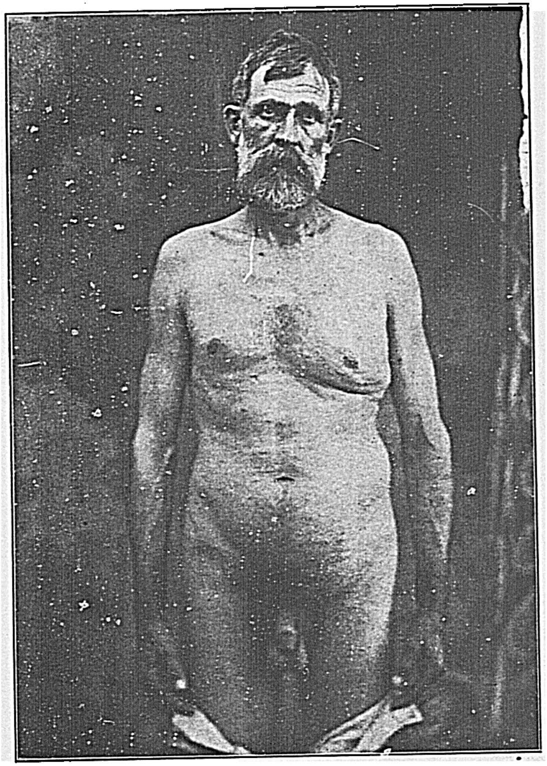


FIGURE 1.—Showing extent of infection in front, also tired expression of face, and greater infection on left side.

read to you what Dr. Stiles has to say on the subject. He has been making investigations and has written a paper which he read before the International Dermatological Association which met in New York. He kindly furnished me the paper:

The Occurrence of a Proliferating Cestode Larva (Sparganum Proliferum) in Man in Florida. By Ch. Wardell Stiles, Ph.D., Chief of Division of Zoology, Hygienic Laboratory, U. S. Public Health and Marine Hospital Service.

Medical History of the Case.—In June of this year I received from Dr. H. Gates, of Manatee, Florida, specimens of worms, for identification, which he has taken from the skin of man. The following extracts from Dr. Gates' letter give all that is known to me regarding the medical history of the case. In connection with this history, it will be well to abstract in considerable detail an account of a very similar case recently reported by Ijima (1905) in Tokyo, Japan.

This article forms part of a paper which was, by permission of the Surgeon-General, presented upon invitation before the Sixth International Dermatological Congress, in New York, Sept. 9-15, 1908.

Gates' Case.—"Enclosed find specimens of worms from human flesh. They are inclosed in sacs in skin and deep under the skin in the connective tissues. My patient has thousands of them all over the trunk; they can be seen and felt as nodules; deeper in the connective tissues in the left groin and left breast there seem to be large masses of them. I send some I obtained by cutting open the nodules and squeezing them out, and others still in the cyst as I found them."—(From letter dated June 17, 1907.)

"In reply to your request for history, etc., of patient (J. W. M.) infected with larval tapeworm, I would state that I first discovered the condition in April of this year. I was called in to treat him for dysentery. While examining over abdomen I found a great many nodules in the skin and also in the fascia between the skin and the muscles. Deep down in the abdominal cavity I found large and small tumors, some movable and others fixed by adhesions. All the lymphatic glands on the side most infected were enlarged and in masses, as if they had formed close union with the surrounding tissues. The muscles were exempt from nodules, but soft and flabby. I opened one nodule near the surface and obtained two worms. Most of the nodules on the skin are about the size and shape of a grain of rice. When they first appear there is an itching produced. The cyst is filled with a clear watery fluid, in which is found the small worm. In a few days a cyst wall is formed, surrounding the worm, which lies in a jelly of slime-like substance. After weeks or months the cyst wall becomes firm and surrounds one or more worms. In some cysts I have found as many as three worms. In the course of a few months the cyst wall breaks and there is nothing left but sometimes a blue spot, showing a small hemorrhage; after this is absorbed, there will be only a spot of indurated tissue to mark the place. The places that have been infected the longest appear as a mass of indurated skin and fascia closely connected, so that the skin can be picked up only with the mass of worm and tissues.

"Patient is now 48 years old. He came to Florida in 1872 from Minnesota and settled with his father on a point on the Manatee River, now known as Mann's Point, which was accessible to fish and oysters.

"When twenty-three years old, while hunting in the woods about a mile and one-half from the coast, he noticed a small pimple on the left shoulder, which attracted his attention because of the itching. He thought the skin had been punctured by a thorn. He squeezed spring of 1904, she visited the University Hospital at Tokyo for treatment for left inguinal herni, entering the surgical wards of Dr. J. Kondo. This hernia was traceable to the presence of parasites in the region of ligamentum poupartii. In addition to the hernia, she presented a peculiarly swollen condition of the integument, which bore scattered spots of acne-like appearance.

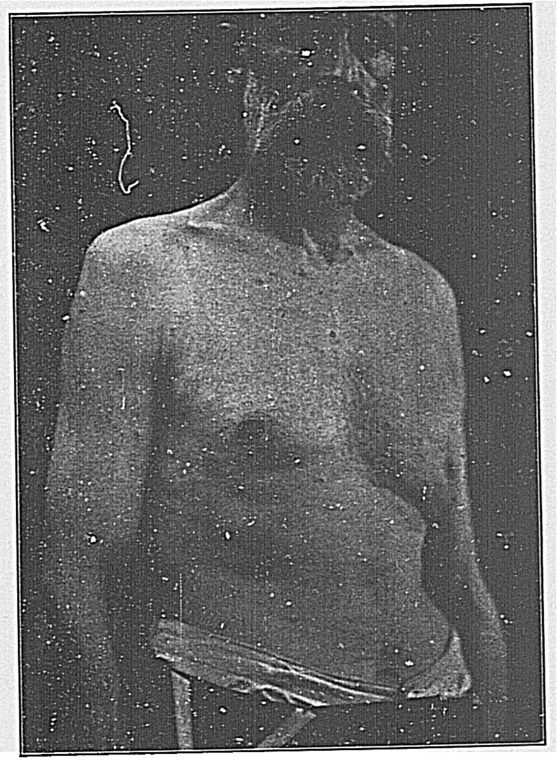


FIG. 3.—Showing enlarged left breast.

This abnormal condition existed over nearly the entire body, except on the face and upper extremities; it was most prominent on the left thigh, which was greatly swollen and presented very much the appearance of elephantiasis, although the skin and underlying tissues were quite soft, so that they hung down by their own weight and could be grasped as a flaccid mass by the hand. When twenty-five years of left groin and lumbar region. Spleen and liver are enlarged.

"The infection is slight in the right side.

"There was probably another case similar to this a few years ago, in this country. I have been trying to obtain a history of it, but have failed thus far. The man moved from here to California, where he died.

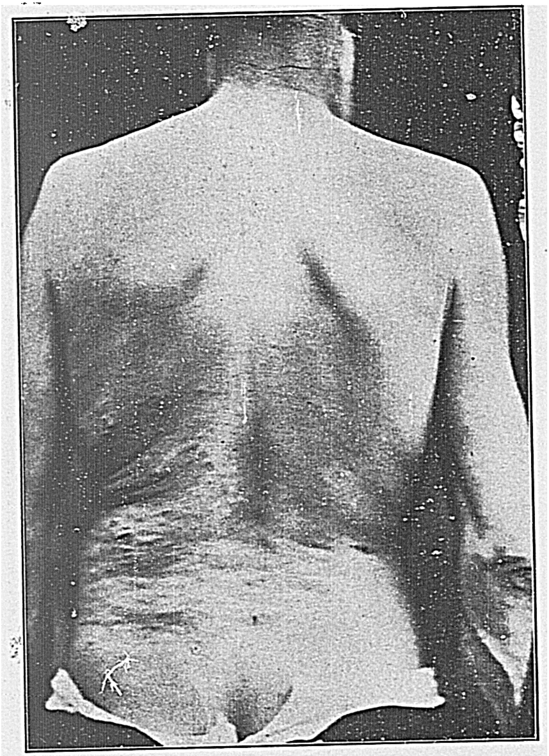


FIG. 2.—Photograph showing acne-like condition due to infection with Sparganum Proliferum.

"Patient has a wife and five children, all of whom are healthy."—(Extract from letter August, 1907.)

Japanese Case.—The patient was a Japanese woman, Yae Tamaka by name, resident in Tokyo or immediate vicinity. Before her marriage to a dealer in old furniture, she was a weaver, "occupations which place her decidedly in the lower class of society."

At the age of thirty-three years, in the

9 and 24, 1904, a very large piece of skin, with the underlying connective tissues, was excised from the left thigh, in order to relieve the patient of the superfluous tissue. Several pounds of weight were removed during patient's stay in hospital.

When freshly excised, the subcutaneous tissue presented an unusual appearance. At places several centimeters thick, they were moderately rich in panniculus adiposus and extraordinarily rich in lymph; the latter swelled the connective tissues between the panniculi, giving it a slimy or gelatinous appearance and consistency; the slimy character seemed more manifest in the deeper parts; lymph exuded copiously from the cut surfaces; numerous capsules, with the contained worm, were observable and whitish objects, isolated or in clusters, in all parts of the tissues.

The thickness of tissues between the surface and the underlying tissue measures 30 to 60 mm., notwithstanding the fact that the hardening process has contracted the subcutaneous connective tissues, through loss of the lymph, into dense fibrous bundles, so that it no longer bears a resemblance to what it was in the fresh state. The corium in the same piece may be said to be three to six mm. thick; it seems to be on the whole considerably thicker than in the normal state.—(Abstract from Ijima, 1905.)

Further medical details are not given by Ijima, but he states that Professor Kondo will publish a report of clinical and pathological observation. I have not as yet learned of the publication of the report in question.

From the foregoing abstracts the suspicion immediately arises that in Florida we have a skin infection, hitherto unrecognized for the American continent, and similar to, perhaps identical with, an infection recognized only on one former occasion, namely in Japan.

Both cases occurred near the eastern shore of the continent in question (Old World, between 35 degrees and 36 degrees N.; and New World, between 27 degrees and 28 degrees N.); both patients lived in cities or towns, located directly on the water, very near larger bodies of water (Pacific Ocean and Gulf of Mexico); both patients, though of different sex, were adult (23 years male, 31 years female) when the infection was first noticed; both patients belonging to the lower class of society; one had a professedly fish diet; the other lives in a country where a fish diet is very common; both infections are of long standing (in one case of over three years, in the other case about 25 years); in both cases the number of individual worms present was very great; both observers (Ijima for Japan, and Gates for Florida) independently call attention to the acne-like lesion resulting from the infection; each patient is a native of the country in which the case was found, and in neither case is there any history given

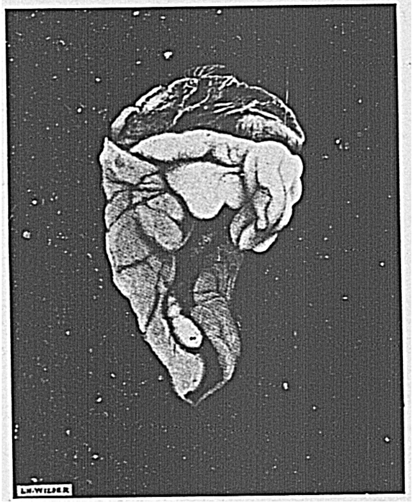


FIG. 5.—Sparganum Proliferum in part in cyst. Original x10.

old the patient had a tapeworm, the species of which is not known. The dermal affection was first felt when she was thirty-one years old, so that at the time of entrance to hospital it was of about two years standing. It had given no particular trouble beyond that imposed upon motion by the swollen thigh and the itching of the skin in parts where a pimple-like hardening made its appearance; scratching with the nails, in order to allay the itching, had led to breaking the skin, from which a soft whitish mass, together with some fluid, could be pressed out. A number of resulting recent scars, especially on the breast, were visible.

In preparation, made of skin taken from the left thigh, Ijima became convinced of the presence in the connective tissues of numerous encapsuled worms, the cestode nature of which was recognized from the calcareous corpuscles.

On each of two subsequent occasions, July

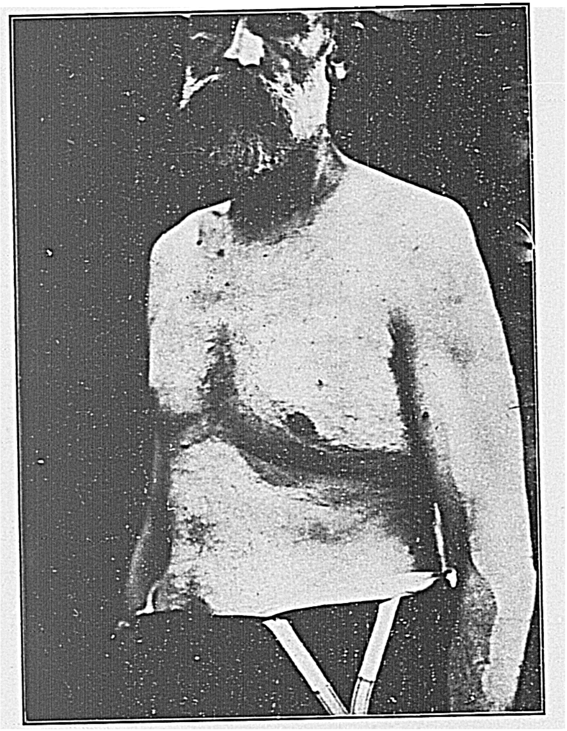


Fig. 4.—Showing flabby left breast.

nence. On a piece of the preserved skin about two inches square, Ijima found at least four such prominences, which, as seen on the surface, appear smooth and less pigmented than the surrounding parts.

Capsules so superficially situated might easily be ruptured by force applied through the skin from without. In shape the capsules are generally subspherical or eoid. While the smallest of them is considerably less than 1 mm., others measuring from 1 to 2 mm. or more are of quite common occurrence; one of the largest seen was elongated 2.5 mm. The larger capsules were found only in the subcutaneous parts, not in the corium.

The capsular wall, consisting of a dense felt-work of connective tissue fibers of the host, may reach nearly 0.33 mm. in thickness; in sections, the capsules may appear not unlike a transversely cut blood vessel, on account of the tough and compact looking wall; under a hand lens, the inner surface of the capsule appears smooth; in some of the larger cysts the internal cavity is traversed by branching trabeculae; microscopically the wall either shows no special limiting structure or is lined with a deposit of granular coagulum or tissue debris.

ABUNDANCE OF PARASITE.

In Dr. Gates' letter of June 17, he states that his "patient has thousands of these parasites."

In the Japanese case a section of about 11 sq. cm. showed nearly sixty capsules; in the most thickly infested tissue, this gave 1,000 capsules per 100 cu. cm. of tissue. It was estimated that there must have been considerable over 10,000 capsules in the left thigh alone.

WORMS WITHOUT CAPSULES.

Scarcely any of the worms Gates forwarded to me bore any remnant of the cyst. Very probably most of these specimens were originally encysted and were freed from their cyst by Dr. Gates before he forwarded them.

MOVEMENTS OF THE WORM.

Not having seen the worm alive, I can give no details regarding movements. Ijima reports that the living worms, when taken from the patient, showed slow movements of extension and contraction, but affecting little or no change in position; upon cooling the worms

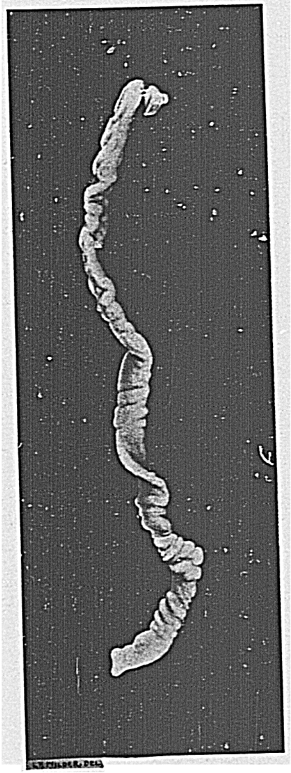


FIG. 7.—One of many forms.

The simple plerocerous-like larva when encysted may assume a rather complicated structure, due to its ability to form buds or supernumary heads, especially on the lateral edges of the flattened body in younger specimens, but quite irregular in the more complicated older forms. When the heads detach themselves they represent small independent plerocerous-like larva, and their method of formation explains the presence of several worms in one cyst.

The formation of heads in the manner described naturally tends to give the worms a very irregular outline; this irregularity is increased by the formation of subcuticular bodies, which Ijima interprets as food material. Ijima assumes that the young heads leave the capsule through the connective tissue until they grow in size and then in turn form a capsule of their own.

MICROSCOPIC ANATOMY.

According to Ijima, the outline of the Japanese form may attain 8 mm. in thickness; the dermal musculature consists of external circular and internal longitudinal fibres. These statements are correct as applied to the Florida form also.

The calcareous corpuscles of the Japanese worm are described by Ijima as spherical or ellipsoidal 7.5 to 12 mm. in diameter, and abundant in all parts of the parenchyma except in the head, in which they are lacking. In the Florida form also the calcareous corpuscles are abundant; they vary in size from 8.8 to 17.6 mm.; in shape they are spherical or ellipsoidal.

Thus, in reference to the size of the calcareous corpuscles, there seems to be a slight difference between the American and Japanese parasites.

RESERVE FOOD BODIES.

Ijima has described as present in the parenchyma certain bodies which he views as reserve food material. Usually they are roundish or oval, 100 to 300 mm. in diameter, but they may become elongated and very long.

In the Florida parasite similar bodies are present, but in the specimens thus far examined microscopically they do not seem to be quite so numerous or quite so large and prominent as described by Ijima for the Japanese form. It is possible, however, that this is a matter of individual variation.

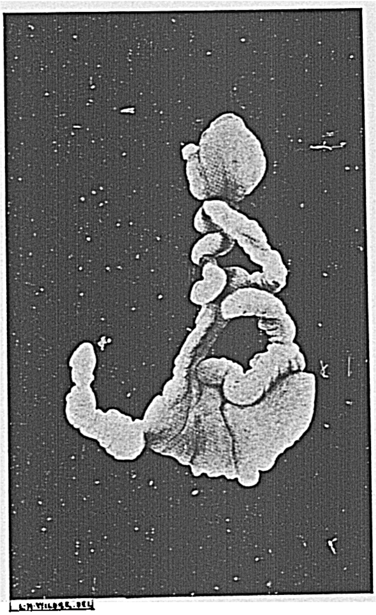


FIG. 9.—One of the many forms.

EXCRETORY SYSTEM.

The parasites as described by Ijima contain an extensive system of anastomosing excretory vessels. In this respect the Florida form agrees with the Japanese species. Some of the canals are quite large, some are very small. Ijima calls attention to the absence of excreno longer exhibited such movements; in case of worms placed in salt solution, motion could be revived up to a period of four hours if the parasites were slightly warmed.

The head (narrow end) was the most motile, evaginating and invaginating at the apex, in addition to shortening and extending; the terminal, but inconstant, depression in some cases reminded the observer of a terminal sucker, such as seen in the fish, bothriocephalid cyathocephalus. In addition to a motion, as if feeling about, the head started a lively peristalsis from before backward; such combined movements would aid the worm in penetrating and moving through tissues.

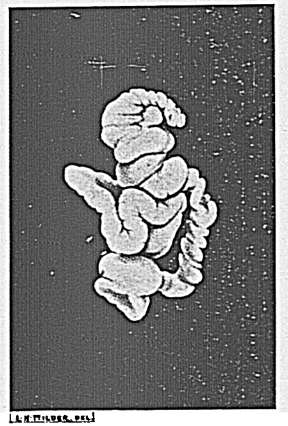


Fig. 8.—Folded up as found in cyst.

The broader parts of the body showed at most slow vermiform movements, with more or less constant indentation at the extreme hind end.

THE HEAD.

Ijima states that the head of his parasite is devoid of any definitely formed or permanent organ of attachment. This holds true also for the worm found by Gates. In some few specimens a slight apical depression is observed, but as the material is preserved in alcohol this might possibly be either an artifact or a depression due to sudden contraction on the part of the worm.

ENCYSTED WORMS.

Gates writes that he found as many as three worms in one cyst. This condition is doubtless due, as Ijima explains also for this case, to the tendency of the worms to multiply by budding. Ijima reports that the smallest capsules usually contained a single worm; in the largest cysts, however, two or more worms or pieces were more frequently found; from one capsule five worms were obtained, and from another seven worms.

SIZE AND SHAPE.

The longest specimen I have observed is 12 mm. in length. Some of the worms are simple elongated bodies, either more or less flattened, or nearly round in transverse sections. The larger specimens, however, assume all manner of bizarre and irregular shapes which cannot be well described. These variations in form may be reduced to a progressive but irregular formation of buds, the apex of each bud representing a structure similar to the cephalic end of the original worm; the form varies, of course, according to the number, position, contraction, etc., of the buds, and according to the contraction of the parent stock. Figs. 5 to 15 will give an idea of the great variety of forms found.

According to Ijima, many of the worms are small, filiform, about 0.3 mm. in diameter, 3 mm. in length ;others attain, even when moderately contracted, 12 mm. long by 2.5 mm. broad. In some specimens the body is flattened, dorso-ventrally, but there is no clew to which is dorsal and which is ventral surface. In its simplest form the worm is plerocercus-like, or narrow at the head and broader caudal, when moderately contracted, or irregularly cylindrical when strongly contracted.

tematic position is not clear at present and cannot be well determined until the adult stage is known.

So far as can be judged from the material thus far studied (prior to the meeting of the International Dermatological Congress in New York, September 9, 1907), the Florida form must be considered as very closely allied to, perhaps specifically identical with, the Japanese form. The only anatomical point of difference thus far brought out is a difference in size of the calcareous corpuscles; the only biological difference known is the habitat in two widely separated localities.

Ijima points out the structural affinities between the Japanese form and the bothriocephalid larval Sparganum, of Diesing; he refers also to the similiarity between the Japanese form and the "Ligula mansoni" (Sparganum mansoni).

Sparganum is an artificial collective group of worms, distinctly proposed not as a systematic unit, but as a collective group of larval bothriocephalid cestodes. Under the International Code of Nomenclature (1907) such names may be proposed as a matter of convenience and may be used as if they were generic names; they do not require any type species, and hence do not compete with the generic names under the law of priority.

Both the Japanese and American parasites may be temporarily classified in Sparganum.

The Japanese worm was originally published under the two names, "plerocercoides prolifer," and "plerocercus prolifer," but Ijima distinctly states that he used the names as a matter of convenience, namely, not in a taxonomic sense. Certain objections arise, however, to the use of the names plerocercus and plerocercoides in this connection, and on this account I transfered (1906a) the parasite to Sparganum.

The nomenclatural points involved are somewhat complex, and it may be well to explain them in this place.

Under the original International Code, the names of larval cestodes, and of certain other forms, were, for special reasons, exempted from the law of priority. Later (1901) contrary to the judgement of helminthologists, this exemption was done away with.

To apply the law of priority consistently to all such larval names, would be almost an impossibility. There are, in fact, many names which have been proposed not in a generic sense, but as names of admittedly artificial groups, which were used simply as a matter of temporary convenience, and it was on account of a failure to distinguish between names of this category and names proposed for supposed genera that the exception was rescinded. In 1907 at the Boston Congress, an helminthologist proposed the following, which was adopted as part of the code:

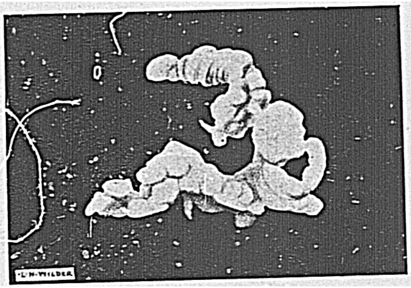


FIG. 11

"Certain biological groups which have proposed distinctly as collective groups, not as systematic units, may be treated for convenience as if they were genera, but they require no type species."

Examples—Agamodistomum, Amphistomulum, Agamofilaria, Agamomermis, Aparganum.

As will be shown below, plerocercus and plerocarocoides also now come under this paragraph. As matters now stand it is necessary to show that a name was distinctly protory vessels in the peripheral zone of the posterior part of the body; he also states that he was unable to find any opening.

In sections of one of the Florida parasites, fine canals were found rather close to the cuticle, but because of the branched condition of the worm it is difficult to state just what portion of the body this was; it was not, however, a head. Likewise, in one case sections of a pore on the surface, with a centripetically directed canal, were distinctly seen. In view of the absence of genital organs one is naturally inclined to look upon this pore as belonging to the excretory system.

The longitudinal muscles of the Japanese worm are described as well developed, and in addition there is less strongly developed set of muscle fibres, running in different directions, but mainly in the transverse plane. Near the head these transverse muscles may be quite regular (some dorso-ventral, other crossing these at right angles), but in thicker portions of the body they may become very irregular. This description applies in a general way to the Florida form also.

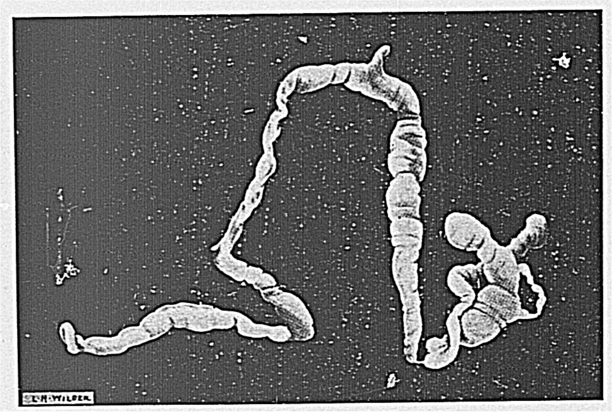


FIG. 10

NERVOUS SYSTEM.

Ijima noticed a pair of longitudinal lateral nerve trunks in the cephalic portion; they seemed to unite close to the tip of the head. In several sections of the Florida worms nerves were distinguished, but details as to their topography were not studied.

LIFE CYCLE.

Experiments to raise the adult stage by feeding the Japanese parasites to cats, dogs and pigs were negative.

As all of my own material was preserved, no experiments could be undertaken. The question as to the source of infection, life, cycle, etc., must be left open for the present.

SYSTEMATIC POSITION.

From the general structure, especially from the presence of calcareous corpuscles, it is clear that both the Japanese and Florida parasites are cestodes; the absence of suckers seems to place both forms in the old family of bothriocephalidae, now known as dibothriocephalodae. Further than this, the exact sysfrom the cysticercoids by having parenchymatous tails; as examples Baun cites a form which occurs in the body cavity of Trichodectis canis, and the young (Gyporhynchus) of Taenia macropoes and T. unilateralis.

Blanchard (1883a, 491) used a French term, (Plerocercoides) of the word, while Neuman (1892a, 537) seems to have first used the Latin, Plerocercoides. From Neuman's text, however, it is clear that he based his name on Braun's "Plerocercoiden," hence Neuman's Pleroceroides is not a generic, but the designation of an artificial collective group, hence also the type designation (bailleti) suggested by myself in 1906 is not necessary under the new 1907 code.

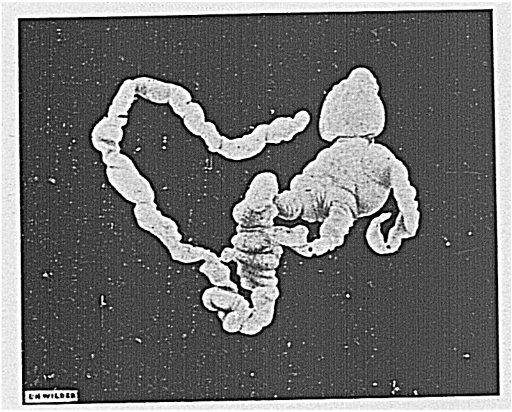


FIG. 13

As a plerocercus may be the larval form of species belonging to widely distinct families, even to different orders, it is wise not to use the combination Plerocercus prolifer in case a better designation is available; this point probably occurred to Ijima, for he used the combination only once. Plerocercoides is also open to the same objection, and in the only use of the term prior to Ijima it was used for a Dithyridium.

SPARGANUM, DIESING, 1850.

It so happens that Diesing proposed a name which is open to fewer objections. This is the collective group diagnosed Dibothriocephalidæ. An artificial collective group to contain larval stages of bothriocephalid worms, which have not reached a stage in their development that they can be determined generally. Such groups do not require type species.

In 1906, I placed Ijima's form in this group as "The Proliferating Japanese Tapeworm Larval," Sparganum proliferum (Ijima, 1905), Stiles, 1906.

Specific Diagnosis. — Sparganum: Larva may attain 1 to 12 mm. in length, and 2.5 mm. in breadth, head narrower and more motile than posterior end, and may show an apical depression, which perhaps serves as suckers or organs of attachment present. Calcareous corpuscles, spherical or ellipsoidal, 7.5 to 12 mm. (Japanese worm) in diameter, or 8.8 to posed to designate an artificial collective group in order to bring it under this provision. A name like cysticercus or echinococcus originally proposed as generic, not distinctly to cover an admittedly artificial group, is subject now as before to the law of priority.

The term plerocerus was proposed by Braum (1883a, 98), as designation for the parenchymatous cysticeri (namely, those the caudal portion of which contains no fluid), as distinguished from the bladder worms, or true cysticeroi: thus it is a descriptive term for a stage of development (larval) possessing certain characters, but not the designation of a systematic unit. As examples, Braum cited a plerocercus of tetrarhynchus. This plerocercus of the lizards happens to figure in a true nomenclatural sense, namely, in the genus 1 m.

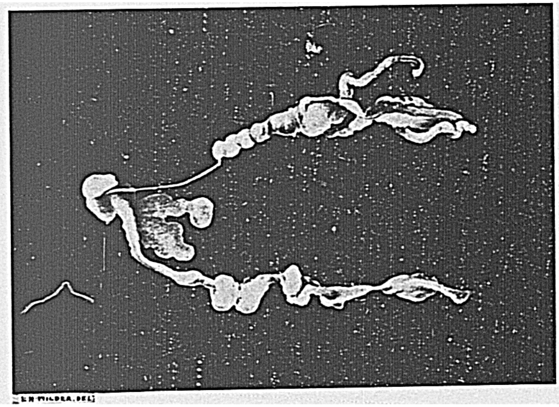


FIG. 12

DITHYRIDIUM RUDOLPH, 1819.

1819: Dithyridium Rud., 1819a, 559 (lacertae viridis, lacertae muralis; Europe. Typr by later absolute tautonymy Piestocystis dithyridium—Dith. lacertae).

1850: Piestocystis Dies., 1850a, 478, 494-496 (Dythridium 1819 renamed; includes a valied species' P. crispa (Rud.) P. rugosus Dies P. variabilis Dies., Pdithyridium Dies (for Dithyridium of Rud., namely, D. lacertæ Valenciennes, 1844.)

This genus is based upon a larval tapeworm (a plerocercus), provided with four suckers, and is classified in the family Taeniidæ; the type species occurs in Europe, in lizards of the genus Lacerta.

In 1866 Baillett mentioned a parenchymatous cysticercus, namely, a pleorcercus) from the abdominal cavity of a cat and dog.

In 1882 or 1883, Blumberg describes this form as a new species under the name Cystucercus elongated; the latter name, however, was already preoccupied (cf. C. elongatus Lenck., 1842).

In 1885 Railliet renamed this form Cysticercus bailleti, and in 1893a, p. 314, he classified it in the genus Dithytidium as D. elongatum. In the meantime, however, Neuman (1892a, 537-539, Figs. 292-293) refers to the same parasite as "Plerocercoides bailleti," clearly using a Latin binominal nomenclature.

The name Plerocerdoides as used by Neuman is traceable to Baun (1883a, 100), who used a German term "Plerocercoiden," to designate certain larval forms which differed

17.6 mm. (Florida worms), and situated in any part of the body except head; irregularly distributed reserve food bodies present in older specimens; but they later undergo disintegration; genital organs not present; longitudinal muscles better developed than either dorso-ventral or transverse system; transverse fibres do not divide body into cortical and medullary layers; excretory system well developed, consisting of larger approximately longitudinal branches with anastomeses. The larvae possess the power of multiplying by transverse fission and of forming supernumerary heads which may become independent. Adult unknown.

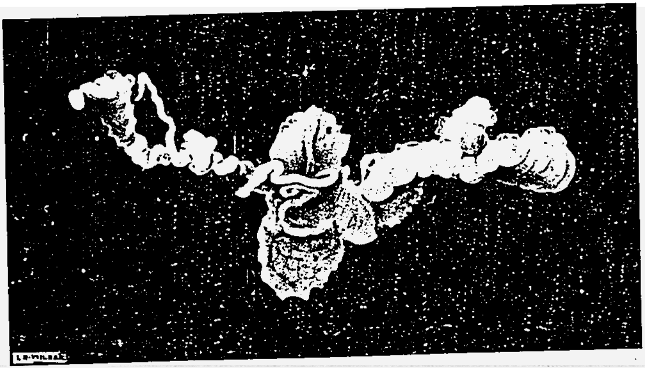


FIG. 14.—One of the multi forms.

Habitate.—Encysted in subcutaneous tissue and elsewhere in man.

Geographical Distribution. — Found but twice, once by Ijima in Tokyo, Japan; once by Gates in Manatee, Florida.

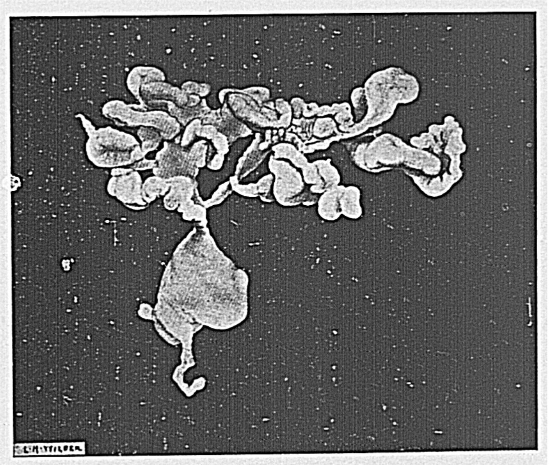
Whatever results may be obtained by examination of further material, which I could not study prior to the meeting of this International Congress, at the present time I do not feel justified in separating the American form specifically from the Japanese species, despite the difference in geographical distribution and the slight difference in the calcareous corpuscles. That the adult stage may eventually prove the Florida form to represent a distinct species seems entirely possible; in fact, when we consider the seeming isolation of the two cases this appears probable. At the same time, if it should eventually be shown that the infection was contracted from eating marine fish, the possibility would not be excluded that the two forms are identical, despite the wide difference in locality. In the interest of conservation, accordingly I classify for the present the two in the same species.

In an earlier paper (1906a, 86) I called attention to the fact that because of the remarkable reproduction of the larval stage described by Ijima, a new genus would probably be justified. I hesitated somewhat to make the genus without seeing actual specimens. I am further convinced of the probability that the worm in question represents a new genus. The proposition of a new generic name at this time presents both advantages and disadvantages. To continue to call the worm Sparganum shows that the family position is recognized, but that the adult is unknown. The worm is, however, so different from the other forms of Sparganum that it seems advisable to bring out this difference in a generic name;

further, as long as a new generic name seems almost inevitable, it would appear wise to introduce it as soon as possible, in order to reduce its competition (through homonymy) in the future.

On the other hand, to introduce a new combination at present, does not seem absolutely necessary; its introduction would destroy the advantages we have at present in the use of the name Sparganum.

There is, I believe, a conservative method by which the advantages of both plans may be united, namely, by the introduction of a new subgeneric name. This course permits the continuation of the use of the name Sparganum, and, at the same time, brings out the fact that the worm is very different from the other forms of Sparganum; further, it procures for the name and advantages in homonymy, which may be gained by its proposal this year instead of later.



Showing buds and supernumery heads.

As such subgeneric name, I suggest *"Gatesius."*

Diagnosis.—Dibothricephalidae, Ligulinae, classified temporarily in "Sparganum: Adult unknown. Larva in its simplest form, similar to the plerocercus of Dibothriocephalus, except for suckers, which are absent; possesses the property of branching and of reproducing by budding, thus forming supernumerary heads which become free from parent and assume the simple plerocercoid form. Body contains numerous calcareous corpuscles, richly developed canal system, and may contain reserve food bodies.

Type Species.—Sparganum (Gatesius) prolifer (Ijima 1905). Stiles 1907, from connective tissue of man; Japan.

Dedicated to Dr. H. Gates of Manatee, Fla., who found the first American case.

It will be noticed that from the form of this proposal, the name Gatesius is proposed not as a collective group, similar to Sparganum, but as a true systematic name of subgeneric rank. When the adult form becomes known, the species should be taken out of the group Sparganum and this subgenus raised to generic rank.

I still have case under observation and when he dies will make postmortem and full report on findings.